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09/610,050	07/05/2000	Jiann-Ching Guey	1280.00170	4708

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EXAMINER	
RYMAN, DANIEL J	

ART UNIT	PAPER NUMBER
2665	3

DATE MAILED: 10/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/610,050	Applicant(s) GUEY ET AL.	
	Examiner Daniel J. Ryman	Art Unit 2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☒ Claim(s) *17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 July 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. Figure 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. The references cited on page 9, lines 7-15 of the specification should be included in an IDS.

Specification

3. The disclosure is objected to because of the following informalities: on page 3, line 5 "Particularly, The receiver" should be "Particularly, the receiver".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 13-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 13 discloses that the signals are sampled and then transformed into a discrete time domain. In the time domain, the signals are combined and then inverse transformed. The specification discloses on pages 13-15 and Fig. 6 that the sampled signals are Fourier transformed, where the Fourier transform transforms time-domain signals into frequency domain signals. Combined in the frequency domain, and then inverse transformed back to the time-domain. For the purposes of prior art rejections, the Examiner will interpret claims 13-17 to have signals sampled in the time domain, Fourier transformed into the frequency domain, combined in the frequency domain, and then inverse-Fourier transformed back to the time domain.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-11 and 19-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Secord et al (USPN 6,097,712) in view of Dent (USPN 6,507,602).

8. Regarding claims 1, 19, and 25, Secord discloses a receiver for a multi-carrier CDMA system for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence (col. 1, lines 4-12; col. 1, lines 41-52; and col. 4, lines 22-23), where it is implicit that

the receiver could be in a base station or a mobile terminal, comprising: a plurality of down-converters down-converting the received signal to baseband signals (col. 5, lines 4-14 and col. 6, lines 30-65); a delay and channel estimator to produce an estimate of channel gain and multi-path delay (col. 5, lines 33-37 and col. 6, lines 41-49); and a plurality of demodulators, one for each of the plural sub-carriers, and operatively coupled to the delay and channel estimator (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where Secord discloses "at least one demodulator" such that a plurality is obvious, each demodulating one of the plural baseband signals using the estimate of channel gain and multi-path delay (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where demodulating for each sub-carrier is well known in the art as is evidenced by applicant (page 1, lines 17-20). Secord does not expressly disclose that the delay and channel estimator correlates at least one of the baseband signals with a single wideband pilot signal, the single wideband pilot signal comprising all of the known pilot sequences, to produce an estimate of channel gain and multi-path delay since Secord discloses only that the channel estimate is produced in a known manner (col. 5, line 4-col. 6, line 65). Dent teaches, in a CDMA system, that it is well known to correlate a received pilot signal with a known pilot signal in order to obtain the channel estimate (col. 6, lines 9-18). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the delay and channel estimator correlate at least one of the baseband signals with a single wideband pilot signal, the single wideband pilot signal comprising all of the known pilot sequences, to produce an estimate of channel gain and multi-path delay.

9. Regarding claims 2, 20, and 26, referring to claims 1, 19, and 25, Secord in view of Dent discloses that the plurality of down-converters comprise one for each sub-carrier (Secord: col. 5, line 4-col. 6, line 65).

10. Regarding claims 3, 21, and 27, referring to claims 1, 19, and 25, Secord in view of Dent discloses that the plurality of down-converters comprise a plurality of sub-carrier down-converters, one for each sub-carrier, and a composite down-converter down-converting the received signal to a composite baseband signal (Secord: col. 5, line 4-col. 6, line 65) where the receiver can comprise the arrangements of both the prior art receiver and the inventive receiver such that it comprises a plurality of down-converters, one for each sub-carrier and one for the composite baseband signal.

11. Regarding claims 4, 22, and 28, referring to claim 3, 21, and 27, Secord in view of Dent discloses that the delay and channel estimator is operatively coupled to the composite down converter for correlating the composite baseband signal with a composite of the known pilot sequence to produce an estimate of channel gain and multi-path delay (Secord: col. 5, line 4-col. 6, line 65).

12. Regarding claims 5, 23, and 29, referring to claims 1, 19, and 25, Secord in view of Dent discloses that the delay and channel estimator comprises a plurality of correlators, one for each sub-carrier, and outputs of each of the plurality of correlators are combined to produce the estimate of channel gain and mufti-path delay (Secord: col. 1, line 59-col. 2, line 18 and col. 5, line 4-col. 6, line 65 and Dent: col. 6, lines 9-18).

13. Regarding claims 6, 24, and 30, referring to claims 1, 19, and 25, Secord in view of Dent further discloses a plurality of correlators, one for each down-converter, each correlating one of

the baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and mufti-path delay, and wherein the plurality of demodulators selectively demodulate the plural baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and mufti-path delay produced by the plurality of correlators (Secord: col. 5, line 4-col. 6, line 65, esp. col. 6, lines 59-65 and Dent: col. 6, lines 9-18).

14. Regarding claim 7, Secord discloses a receiver for a multi-carrier CDMA system for receiving a signal transmitted having a known pilot sequence on plural sub-carriers (col. 1, lines 4-12; col. 1, lines 41-52; and col. 4, lines 22-23), comprising: a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide plural sub-carrier baseband signals (col. 5, line 4-col. 6, line 65); a composite down-converter down-converting the received signal to a composite baseband signal (col. 5, line 4-col. 6, line 65); a delay and channel estimator operatively coupled to the composite down converter to produce an estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65); and a plurality of demodulators, each operatively connected to one of the sub-carrier down-converters and filters and to the delay and channel estimator (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where Secord discloses "at least one demodulator" such that a plurality is obvious, each demodulating one of the plural sub-carrier baseband signals using the estimate of channel gain and multi-path delay (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where demodulating for each sub-carrier is well known in the art as is evidenced by applicant (page 1, lines17-20). Secord does not expressly disclose that the delay and channel estimator correlates at least one of the baseband signals with a single

wideband pilot signal, the single wideband pilot signal comprising all of the known pilot sequences, to produce an estimate of channel gain and multi-path delay since Secord discloses only that the channel estimate is produced in a known manner (col. 5, line 4-col. 6, line 65). Dent teaches, in a CDMA system, that it is well known to correlate a received pilot signal with a known pilot signal in order to obtain the channel estimate (col. 6, lines 9-18). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the delay and channel estimator correlate at least one of the baseband signals with a single wideband pilot signal, the single wideband pilot signal comprising all of the known pilot sequences, to produce an estimate of channel gain and multi-path delay.

15. Regarding claim 8, referring to claim 7, Secord in view of Dent discloses that the composite down converter down-converts the received signal relative to a center carrier frequency and the sub-carriers are separated with respect to the center carrier frequency (Secord: col. 5, line 4-col. 6, line 65).

16. Regarding claim 9, referring to claim 8, Secord in view of Dent discloses that the composite of the known pilot sequence comprises a sum of the known pilot sequences (Secord: col. 5, line 4-col. 6, line 65).

17. Regarding claim 10, referring to claim 7, Secord in view of Dent further discloses a plurality of correlators, one for each down-converter, each correlating one of the baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and multi-path delay, and wherein the plurality of demodulators selectively demodulate the plural baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path

delay produced by the plurality of correlators (Secord: col. 5, line 4-col. 6, line 65, esp. col. 6, lines 59-65 and Dent: col. 6, lines 9-18).

18. Regarding claim 11, Secord discloses a receiver for a multi-carrier CDMA system for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence (col. 1, lines 4-12; col. 1, lines 41-52; and col. 4, lines 22-23), comprising: a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide plural sub-carrier baseband signals (col. 5, line 4-col. 6, line 65); a delay and channel estimator operative to produce an estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65); and a plurality of demodulators, one for each of the plural sub-carriers and operatively coupled to the delay and channel estimator col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where Secord discloses "at least one demodulator" such that a plurality is obvious, each demodulating one of the plural baseband signals using the estimate of channel gain and multi-path delay (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where demodulating for each sub-carrier is well known in the art as is evidenced by applicant (page 1, lines17-20). Secord does not expressly disclose that the delay and channel estimator comprises a plurality of correlators, each correlating one of the sub-carrier baseband signals with the known pilot sequence for the one sub-carrier, and operative to combine outputs of the plurality of correlators to produce an estimate of channel gain and multi-path delay since Secord discloses only that the channel estimate is produced in a known manner (col. 5, line 4-col. 6, line 65). Secord also discloses having one delay and channel estimator for each sub-carrier signal (col. 5, line 4-col. 6, line 65). Dent teaches, in a CDMA system, that it is well known to correlate a received pilot signal with a known pilot signal in

order to obtain the channel estimate (col. 6, lines 9-18). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the delay and channel estimator comprises a plurality of correlators, each correlating one of the sub-carrier baseband signals with the known pilot sequence for the one sub-carrier, and operative to combine outputs of the plurality of correlators to produce an estimate of channel gain and multi-path delay.

19. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Secord et al (USPN 6,097,712) in view of Dent (USPN 6,507,602) as applied to claim 11 above, and further in view of Tiedemann, Jr. et al (USPN 6,335,922).

20. Regarding claim 12, referring to claim 11, Secord in view of Dent does not expressly disclose that the delay and channel estimator identifies multi-paths and relative delays for the multi-paths using threshold comparison. Tiedemann discloses, in a CDMA transmission system, using a threshold comparison to identify multi-paths and relative delays for the multi-paths (col. 29, lines 5-38) where the threshold is used to identify a multi-path where an identified multi-path can be used to identify a relative delay. It would have been obvious to one of ordinary skill in the art at the time of the invention to have the delay and channel estimator identify multi-paths and relative delays for the multi-paths using threshold comparison since identifying multi-paths using a threshold is known in the art.

21. Claims 13-16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Secord et al (USPN 6,097,712) in view of Dent (USPN 6,507,602) in further view of Winters (USPN 5,481,570).

22. Regarding claim 13, Secord discloses a method of synthesizing a radio channel profile for a multi-carrier CDMA receiver receiving a signal transmitted on plural sub-carriers (col. 1, lines

4-12; col. 1, lines 41-52; and col. 4, lines 22-23), comprising: down-converting the received signal to baseband and removing the other sub-carriers to provide plural sub-carrier baseband signals (col. 5, line 4-col. 6, line 65); producing an estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65); and producing a composite estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65). Secord does not expressly disclose that sub-carrier baseband signals are correlated with a known pilot signal since Secord discloses only that the channel estimate is produced in a known manner (col. 5, line 4-col. 6, line 65). Dent teaches, in a CDMA system, that it is well known to correlate a received pilot signal with a known pilot signal in order to obtain the channel estimate (col. 6, lines 9-18). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the sub-carrier baseband signals correlated with a known pilot signal to produce an estimate of channel gain and multi-path delay. Secord in view of Dent does not disclose sampling each of the correlated sub-carrier baseband signals; transforming each of the sampled, correlated sub-carrier baseband signals to a discrete frequency domain; combining the transformed baseband signals to produce a combined discrete frequency domain signal; and inverse transforming the combined discrete frequency domain signal to produce a composite correlation output signal. Winters discloses, in a wireless system, combining signals in the frequency domain that were transformed from samples in the time domain because some computations can be simplified if performed in the frequency domain rather than the time domain (col. 2, lines 11-20; col. 3, lines 8-24; and col. 4, lines 25-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to sample each of the correlated sub-carrier baseband signals; transform each of the sampled, correlated sub-carrier baseband signals to a discrete frequency domain; combine the transformed baseband

signals to produce a combined discrete frequency domain signal; and inverse transform the combined discrete frequency domain signal to produce a composite correlation output signal since some calculations are simplified in the frequency domain compared to the time domain.

23. Regarding claims 14 and 15, referring to claim 13, Secord in view of Dent in further view of Winters does not expressly disclose that sampling each of the correlated sub-carrier baseband signals comprises sampling each of the correlated sub-carrier baseband signals at or above the Nyquist rate; however, Examiner takes official notice that sampling at or above the Nyquist rate is very old and well known since this results in a sampled signal that is sufficient to characterize the original signal.

24. Regarding claim 16, referring to claim 13, Secord in view of Dent in further view of Winters does not expressly disclose that transforming each of the sampled, correlated sub-carrier baseband signals to a discrete frequency domain comprises forming discrete Fourier transforms for each of the sampled, correlated sub-carrier baseband signals; however, Examiner takes official notice that performing a DFT on a signal is a very well-known method to transform a time-domain signal to a frequency domain signal.

25. Regarding claim 18, referring to claim 16, Secord in view of Dent in further view of Winters does not expressly disclose that inverse transforming the combined discrete frequency domain signal to produce a composite correlation output signal comprises calculating an inverse discrete Fourier transform for the combined discrete frequency domain signal; however, Examiner takes official notice that performing an IDFT on a signal is a very well-known method to transform a time-domain signal to a frequency domain signal.

Allowable Subject Matter

26. Claim 17 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (703)305-6970. The examiner can normally be reached on Mon.-Fri. 7:00-5:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703)308-6602. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

Daniel J. Ryman
Examiner
Art Unit 2665

DJR
Daniel J. Ryman

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